

CLAIMS

What is claimed is:

- 5 1. In a network supporting virtual network connections associated with clients communicating through a first node, a method comprising:
 - maintaining separate upstream routing policy information and downstream
 - policy information at the first node, the upstream routing policy information being
 - used at the first node to identify a second node to forward upstream traffic
 - 10 received from at least a first client communicating through the first node, the
 - downstream routing policy information being used at the first node to forward
 - downstream traffic received from a node to at least the first client; and
 - for traffic transmitted by the first client through the first node, preventing
 - use of the downstream policy routing information to route the traffic and instead
 - 15 utilizing the upstream routing policy information in the first node to ensure
 - forwarding of the traffic transmitted by the first client from the first node to the
 - second node.
- 20 2. A method as in claim 1, wherein the traffic transmitted by the first client through the first node intended for receipt by a second client is forwarded to the second node.
3. A method as in claim 1 further comprising:
 - receiving a session initiation request from a second client to establish a
 - 25 session to communicate through the first node;
 - from an address server, obtaining network address assignment information
 - for the first client that generated the session initiation request, the assignment
 - information including network address information to be used for identifying the
 - second client; and

populating the downstream routing policy information at the first node to include the network address information identifying the second client.

4. A method as in claim 3 further comprising:

5 receiving a network message from the second client coupled to communicate through the first node, the network message intended for receipt by the first client;

utilizing the upstream routing policy information in the first node to identify a path on which to forward the network message; and

10 forwarding the network message from the first node along the path to the second node.

5. A method as in claim 4 further comprising:

15 based on routing policy information at the second node, establishing a return path between the second node and the first node on which to forward the network messages to the first client through the first node.

6. A method as in claim 1 further comprising:

20 based on use of the upstream routing policy information and downstream policy information at the first node, establishing a VPN (Virtual Private Network) connection between the first node and the second node on which to forward traffic from the first client.

7. A method as in claim 1, wherein the second node is part of a service provider
25 network and the traffic between the first and second node is at least partly supported by a core network supporting a label switching protocol.

8. A method as in claim 1, wherein the upstream routing policy information and downstream policy information at the first node are each half duplex VRFs
30 (Virtual Routing and Forwarding Instances) supporting forwarding of network

messages generated by multiple clients communicating with each other through the first node and the second node.

9. A method as in claim 1 further comprising:

5 at the second node, applying a target-specific packet processing technique to the traffic from the first client forwarded through the second node.

10. A method as in claim 1 further comprising:

10 populating the downstream policy information at the first node with network address information of each new client associated with a given service supported by a corresponding service provider.

11. A method as in claim 10 further comprising:

15 after the downstream policy information is populated in the first node for a new client, distributing the network address information populated in the downstream policy information at the first node to the second node via use of a notification message distributed according to a system routing protocol.

12. A method as in claim 11, wherein the system routing protocol is based on BGP (Border Gateway Protocol).

13. A computer system at a first node of a network that at least partially supports a virtual network connection, the computer system comprising:

25 a processor;
 a memory unit that stores instructions associated with an application executed by the processor;
 a communication interface that supports communication with other nodes of the physical network; and

an interconnect coupling the processor, the memory unit, and the communication interface, enabling the computer system to execute the application and perform operations of:

maintaining separate upstream routing policy information and downstream policy information at the first node, the upstream routing policy information being used at the first node to identify a second node to forward upstream traffic received from at least a first client communicating through the first node, the downstream routing policy information being used at the first node to forward downstream traffic received from a node to at least the first client; and

for traffic transmitted by the first client through the first node, preventing use of the downstream policy routing information to route the traffic and instead utilizing the upstream routing policy information in the first node to ensure forwarding of the traffic transmitted by the first client from the first node to the second node.

14. A computer system as in claim 13, wherein the traffic transmitted by the first client through the first node intended for receipt by a second client is forwarded to the second node.

15. A computer system as in claim 13 that additionally performs operations of:
receiving a session initiation request from a second client to establish a session to communicate through the first node;
from an address server, obtaining network address assignment information for the first client that generated the session initiation request, the assignment information including network address information to be used for identifying the second client; and
populating the upstream routing policy information at the first node to include the network address information identifying the second client.

16. A computer system as in claim 13 that additionally performs operations of:
receiving a network message from the second client coupled to
communicate through the first node, the network message intended for receipt by
the first client;

5 utilizing the downstream routing policy information in the first node to
identify a path on which to forward the network message; and
forwarding the network message from the first node along the path to the
second node.

10 17. A computer system as in claim 13 that additionally performs operations of:
based on routing policy information at the second node, establishing a
return path between the second node and the first node on which to forward the
network messages to the first client through the first node.

15 18. A computer system as in claim 13 that additionally performs operations of:
based on use of the upstream routing policy information and downstream
policy information at the first node, establishing a VPN (Virtual Private Network)
connection between the first node and the second node on which to forward traffic
from the first client.

20 19. A computer system as in claim 13, wherein the second node is part of a service
provider network and the traffic between the first and second node is at least
partly supported by a core network supporting a label switching protocol.

25 20. A computer system as in claim 13, wherein the upstream routing policy
information and downstream policy information at the first node are each half
duplex VRFs (Virtual Routing and Forwarding Instances) supporting forwarding
of network messages generated by multiple clients communicating with each
other through the first node and the second node.

21. A computer system as in claim 13 that additionally performs operations of:
at the second node, applying a target-specific packet processing technique
to the traffic from the first client forwarded through the second node.

5 22. A computer system as in claim 13 that additionally performs operations of:
populating the downstream policy information at the first node with
network address information of each new client associated with a given service
supported by a corresponding service provider.

10 23. A computer system as in claim 22 that additionally performs operations of:
after the downstream policy information is populated in the first node for a
new client, distributing the network address information populated in the
downstream policy information at the first node to the second node via use of a
notification message distributed according to a system routing protocol.

15 24. A computer system as in claim 23, wherein the system routing protocol is based
on BGP (Border Gateway Protocol).

20 25. A computer system at a first node of a network that at least partially supports a
virtual network connection, the computer system comprising:
means for maintaining separate upstream routing policy information and
downstream policy information at the first node, the upstream routing policy
information being used at the first node to identify a second node to forward
upstream traffic received from at least a first client communicating through the
25 first node, the downstream routing policy information being used at the first node
to forward downstream traffic received from a node to at least the first client; and
for traffic transmitted by the first client through the first node, means for
preventing use of the downstream policy routing information to route the traffic
and instead utilizing the upstream routing policy information in the first node to

ensure forwarding of the traffic transmitted by the first client from the first node to the second node.

26. A computer program product including a computer-readable medium having
instructions stored thereon for processing data information, such that the
instructions, when carried out by a processing device, enable the processing
device to perform the steps of:

maintaining separate upstream routing policy information and downstream
policy information at the first node, the upstream routing policy information being
used at the first node to identify a second node to forward upstream traffic
received from at least a first client communicating through the first node, the
downstream routing policy information being used at the first node to forward
downstream traffic received from a node to at least the first client; and

for traffic transmitted by the first client through the first node, preventing
use of the downstream policy routing information to route the traffic and instead
utilizing the upstream routing policy information in the first node to ensure
forwarding of the traffic transmitted by the first client from the first node to the
second node.